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ABSTRACT

This study was conducted to investigate factors that affect the attitudes of preservice teachers towards computer use. The focus was on: (1) the comfort level prospective teachers feel towards using the computer; (2) interest in pursuing other courses in the field of computer technology; and (3) the intent to use the computer in classrooms. Teacher candidates (N=90) enrolled in a state mandated, basic computer literacy course at California Polytechnic State University, Pomona campus, were asked to participate in this survey (a copy of the questionnaire is included). The course is required of all students wishing to obtain a clear teaching credential. Results indicated that teachers' attitudes towards computers are affected more favorably when an understanding as to how computers can be used most effectively is achieved and when teachers are informed about the power of computers in the classroom. Education and exposure would appear to be key issues in the area of stimulating computer use. (LL)

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The Factors that Affect Teacher Attitude Towards Computer Use

By

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Abstract

The purpose of this study was to investigate the factors that affect the attitudes of teachers towards computer use. The focus was on: 1) Comfort the prospective teacher feels towards using the computer; 2) Interest in pursuing other courses in the field of computer technology; and 3) The intent to use the computer in their classrooms. These three variables were the measures of attitude defining this study.

Teacher candidates enrolled in the basic computer literacy course at Cal Poly, Pomona, were asked to participate in this survey. Questionnaires were distributed to students who were enrolled in every section of the course that was offered at the Pomona campus. A total of 90 respondents were obtained. Both descriptive and inferential analyses were made in this study. The technique of forward, free entry multiple regression was used to isolate the factors affecting the measures of teacher attitude.

Results obtained indicated that there were indeed factors that affected the measures of attitude detailed above. Knowledge of these factors makes it possible to make some recommendations with regard to policies that might be established affecting computer education in teacher credential programs.

Introduction

There is a movement in education towards policies which stress the acquisition of computer literacy. Many policy makers believe that for students to survive in today's information oriented culture, that it will be necessary for them to have the skills which facilitate computer use. By requiring students to be knowledgeable in this area, the people responsible for conveying this information must also have specialized training.

The problem is that a single mandated course in computer literacy is unlikely to revolutionize teaching methods and knowledge in the field. Teachers must be motivated to learn computers--which requires that they have favorable attitudes towards the machine.

Very little research has been conducted in the area of what factors promote positive attitudes toward computer use in teachers and teacher candidates. It is the purpose of this study to try and isolate some of these factors. Hopefully, a knowledge of what increases motivation can allow policy makers and schools of education to establish guidelines and curriculums that will stimulate interest in computer use. If teachers do not have positive attitudes towards the computer, they will be unlikely to convey positive messages to their students in this area.

Importance of this Study

Computer use in the society of the United States is something that will become more ingrained and widespread. We live in an information age--which is facilitated by the use of the computer. The students that are currently being educated in the public school system are the same individuals who will be running the country (or not running the country depending on how well they are trained), and who must therefore have the necessary skills to survive in this electronically oriented system.

Part of the duties of educators then, will be to prepare this generation of students to deal with the real world. This specifically means that teachers will need to convey computer skills to students in their classrooms. Yet, educational research seems to indicate

that a large percentage of existing classroom teachers have no knowledge of the computer, or how to use it effectively. Many states are just starting to implement requirements for teachers to be computer literate before they can obtain their clear credentials. Yet, these measures do not address the problem of those teachers already in the classroom who were credentialed before the initiation of these requirements.

Even by requiring teachers to go through courses dealing with computer use, the standards of such courses are not uniform. Certain programs will emphasize different skills or competencies when compared to others. There is debate amongst experts as to what constitutes literacy skills. With all of these conflicting issues--the teacher remains in the midst of these programs, often with little direction. Attitudes towards computer use may be influenced in a negative direction as a result of these uncertainties.

From a realistic standpoint, it is unlikely that computer skills will be transferred to students and encouraged by teachers unless they (the conveyors of information) have positive attitudes towards the use of the computer. It is important that teachers recognize the benefits that computers can provide, and how the knowledge they convey will be useful to their students. Any fears concerning the use of the computer must be overcome. Aspects of how the computer is relevant to the student must be emphasized.

Besides use in the "real world," teachers should be made aware of how the computer is an effective instructional and class managing aid. A large percentage of teachers are unaware of the educational research in the field of computer assisted instruction. Knowledge of how learning is improved and enhanced using the computer might make a real difference in perceived attitude towards computer use. Furthermore, a realization of how much time a computer can save the average teacher in terms of classroom management activities might further support this positive attitude. By having more positive attitudes, teaches may have a greater willingness to pursue further training in the use of the computer--thereby increasing their competencies and overall abilities to teach effectively in the field.

The underlying issue is one of attitude towards computer use. It would be extremely useful to know what factors influence the attitudes of teachers toward the use of the computer. Knowledge of such information might allow policy makers to establish guidelines that might encourage computer use--and the pursuit of further training in the area. It does not seem reasonable that a single state mandated course will revolutionize the teacher's abilities--especially when the magnitude of the knowledge needed to operate the computer is realized. Teachers must want to learn more about the topic. It is the purpose of this study to isolate the factors that may affect this motivation.

Review of the Literature

Computer use is viewed by educators in many different ways. Those who are familiar with the use of the computer generally have more favorable attitudes towards its implementation in the classroom. Educators familiar with the research conducted in this field are aware of the positive impact that computers can have on school age children at all grade levels (Bitter, 1984; McKeown, 1987). Studies have shown that the computer is an effective tool in instilling motivation, promoting the success of the educationally handicapped (even to the point of easing the "mainstreaming process"), promoting critical thinking skills, and enhancing learning retention (Cohen, 1988; Gross, 1989). Caution must be exercised, however, as the computer is not cureall for educational problems. It provides a promising tool that educators can use to help enhance and improve the quality of education. It should also be noted that a knowledge of computer use is becoming more essential for people to survive in today's society (Lockard, Abrams, 1987). Business, government, and industry are becoming more and more oriented towards the use of the computer in this "information age." Schools are charged with the responsibility of helping students prepare to be contributing member of society. Yet:

> Computer education today is by and large not meeting these needs. Forces outside the school will demand that improvements be made or education will not be fulfilling its responsibility to society. (Lockard, Abrams, 1987, p. 437).

It must be realized that care in the implementation of the computer should be exercised, and a thorough education of the classroom teacher in the use of this device must take place before the full advantages of this tool can be obtained.

Some of the important limitations concerning the use of computers in the classroom include the quality of educational software that exists, and the familiarity of teachers with the use of such software, or indeed, with the use of the computer at all. In the area of educational software, teachers must be aware of the fact that there are many programs--both commercially developed and public domain software--that have severe educational limitations (Lockard, Abrams, 1987). Specifically, these packages are lacking in areas such as making effective use of graphics and sound, presenting material in logical sequences (using appropriate pedagogy), stimulating critical thinking skills, and providing appropriate feedback. Some programs fail to maintain records on individual student performance, and also fail to instill interest and motivation (Lockard, Abrams, 1987). The shortcomings of such programs have led many educators to believe that the computer is a "flashy" useless device that is more of a gimmick that a substantial classroom aid. Educating teachers in the area of how to evaluate CAI software--so that poor programs can be screened out--would be helpful in avoiding some of these problems. Secondly, information could be provided to teachers which might allow them to locate professional reviews of software in their subject areas. A great deal of literature exists which is specifically dedicated to courseware evaluation (Hofmeister, 1985; Bitter, 1984; Bitter & Hatfield, 1989). Numerous journals are readily accessible to teachers who wish to discover opinions concerning software in their fields of specialty, as well as those with a more generalized perspective. Greater awareness of what is available can enhance the scope of possibilities for computer implementation. It can also result in a more positive perception of the computer as an educational aid, when the benefits of the various programs within a field are made clear.

The real problem is in getting teachers to be more aware of the computer's capabilities. Many teachers have already formed pre-conceived notions of the computer as a difficult, impersonal machine that may never be mastered. Even those teachers who have a favorable attitude towards the use of the computer have not necessarily moved towards using the computer in their classrooms (Turner, 1989). A large part of this problem is the result of not having the knowledge to use the machine, and not having any kind of familiarity or expertise with computer based or computer managed instruction (Turner, 1989). The question of how a teacher can teach something that he/she doesn't know about becomes a central issue.

Getting teachers to use the computer as an educational aid can be very difficult, especially when colleges of education do not teach techniques that will be relevant or helpful in getting teachers to employ the computer in a practical manner (Turner, 1989). Turner has suggested that the content of courses offered by many colleges of education stress aspects of computing that are not useful to teachers who would want to use the computer for instructional purposes, or for managing their classrooms. It seems that it will be necessary to establish framework for computer literacy programs that is widely agreed upon, and has a practical dimension in terms of actual use.

The term"computer literacy " is not one which has universally accepted definition. There is a debate concerning what aspects of computer knowledge are necessary for a person to be deemed "computer literate." For example, the issue of programming is one which particularly concerns many individuals. Experts disagree on whether programming should be included as part of a literacy program or not. Arther Luehrmann, who is regarded by many an an authority in the area of computer literacy stress the following:

> Computer literacy means the ability to do something constructive with a computer, not just possess a general awareness gleaned from what one is told about computers. A computer literate person can write and interpret a computer program, can select and operate software written by others, and knows from personal experience what a computer is and is not capable of doing. (Lockard, Abrams, 1987, pp 319-20).

It can be argued that a knowledge of programming is extremely useful in allowing a person to appreciate how a computer actually works, and what kinds of effort have been expended in creating sophisticated software packages.

On the other hand, however, it can also be argued that with the development of more user friendly systems and elaborate multi-functional software packages, that a knowledge of programming is not a necessary survival skill (McKeown, 1987). Rather, a knowledge of how to utilize relevant software packages, how to access and manipulate necessary pieces of data, and how to work with various pieces of computer hardware may be more productive to an educator. The following is a compilation of suggested literacy guidelines:

1) Knowledge of what a computer is;
2) How a computer works;
3) What a computer is capable of (Awareness level);
4) What a computer is capable of (Abilities level);
5) Using a computer to solve complex problems;
6) Using the computer as a communication tool;
7) Using various application programs;
8) Comprehending the economic, social, and psychological impact of computer on society;
9) Knowing how to control a computer in an effective way so as to function in an information based society.

(Hunter, 1983; Watt, 1980; Scher, 1985; Riedesal and Clements, 1985).

A teacher must certainly be aware of programs to use and how to use them if the computer is to be an effective tool. The problem is that many colleges of education have too great an emphasis in areas such as programming, so teachers never gain other experiences (Turner, 1989). Although many states have mandated computer instruction for teachers as well as for junior and senior high school students, the actual content of such courses has been highly varied (Turner, 1989). It will probably be necessary to clearly

establish the needs of the individuals taking computer courses, and then provide appropriate forms of instruction.

> There is a need to distinguish between "computer science" teachers, who presumably will be found a the junior high and high school levels, and should be certified in their field like any other subject specialist, and other teachers who should be encourage to first become computer literate and then to use computers in their teaching (Lockard, Abrams, 1987, p. 323).

To expect all teachers to participate in a narrow scope of activities that re geared towards particular avenues such as programming may be doing a dis-service to eduction as a whole, as many teachers many not react favorably, nor will they have an interest and awareness of other possibilities within the field of educational computing.

Another major concern, which has caused many teachers to shy away from computer use has been the difficulty of learning how to use the computer, and the associated amounts of time that must be devoted. Many teachers realize that a substantial amount of time must be devoted not only to learn the basic functions of the computer, but also to master the intricacies of any programming that needs to be applied, to reviewing and applying specific software packages, and to learning any useful utility programs, such as test constructors, word processors, and spreadsheets.

> Our experience at the microcomputer institute for education at Stanford University during the pst two summers indicates that highly motivated teachers can learn to use microcomputers for CAI, learn to program in BASIC, and learn to work with youngsters in computer literacy and computer programming courses in six weeks of full-time study, six hours a day, five days a week--a total of 180 hours. Perhaps this figure could be reduced by careful planning, but what remains would still require more hours of study than any single semester long course. And such a course of study is only a beginning for an educator who wants to use computers professionally. Each computer has its own way of doing things, which must be learned anew regardless of prior experience. Each of the half dozen or so computer languages in widespread use requires further hours of study. Utility programs--word processors, database management systems, electronic spreadsheets, and so on--also require further study (Walker, 1983, p. 106).

Because teachers and teacher candidates are aware of the complexity of the computer and the time required to master these systems, there is sometimes a great deal of fear where computer use is concerned. Many teachers feel threatened by the prospect of

having to learn a subject that is completely foreign. Furthermore, the prospect of having to teach a class using a device that has not been mastered can be quite intimidating (Turner, 1989). Many professionals do not feel comfortable with teaching in an area where their students might have more ability and experience.

Overall, it might be stated that the level of interest and motivation to use a computer is related to the amount of expertise a person has using a computer. In a study conducted at the University of Toronto by Robin Kay, computer literacy and attitudes towards computer use were compared between males and females. Th results of this study indicated that males has significantly higher literacy scores than females, and were also significantly more inclined to use computers in their classrooms (Kay, 1989). From this information, it can be reasoned that motivation may be correspondingly lacking in a population of teacher candidates with little or no computer experience. Indeed, Friedman has stated:

> Resistance is actually far more common that many believe, and must be countered directly. Much of this resistance can be attributed to lack of understanding and experience, or even misinformation. This underscores further the need for staff development. (Friedman, 1985).

It appears that to promote further interest in courses, we must give teachers experience in computer use.

Conclusion

Computers have some true advantage as far as educational enhancement is concerned. There are many studies with show that the computer is an extremely effective tool that can not only improve the quality of education, but can also reduce the amount of time that is spent doing the clerical or administrative type tasks associated with teaching.

The problem in this area is that teachers have been slow in moving towards the implementation of the computer in the classroom. This problem can be attributed to several causes--ths most significant of which is the lack of knowledge or understanding of how computers can be used most effectively. Colleges of eduction can be blamed in part, for failing to educate teachers properly. This is due to a lack of agreement with regards to

what aspects of "computer literacy" are most important and relevant to teachers. It seems clear the uniform, meaningful standards could be established at either the state or federal levels to help allow the institutions responsible for teacher education to create meaningful curriculums. This may require coordinated, cooperative effort amongst the recognized experts in this field. Additionally, teachers themselves must be encouraged by their districts and/or peers to utilize the machine.

The literature shows that the time necessary to master the use of the computer is an intimidating factor to many teachers. The problem is that teachers who are interested in using the computer are more likely to b those who already have some kind of computer experience--whereas those who have no knowledge of the machine are more hesitant. The question of how to motivate this portion of the teaching population is a key issue--especially since there are many teachers in the modern workforce who have never had any experience in using the computer (One can see that a Catch-22 situation exists in this area). A reasonable suggestion might be to maintain open communication between curriculum planners and teaching staff, coupled with non-threatening opportunities to learn about computers.

The literature does not concentrate on what specific aspects might influence teacher attitudes towards the use of the computer. There is little information concerning the details in this area. It is hoped that this study may isolate specific factors that affect teacher motivation and interest in computer use.

Objectives

This study will attempt to determine the factors that affect teacher attitudes towards the use of the computer. Knowledge of the factors which may cause teachers to be positively inclined towards computer use might help in structuring curriculums that will promote enthusiasm and interest in this area.

It seems reasonable that the number of math courses (the math proficiency of the student) may affect their interest in the use of computers--since computers are mathematically oriented. The number of computer courses a student has had may also be an influence, since a greater knowledge of the computer's capabilities may cause the individual to view the computer in a more positive light. It is hypothesized that the amount of experience a person has had in using the computer (years of computer use) will be an important factor affecting attitude--particularly comfort using the computer. And finally, the student's perception of the importance of computers at various levels and in different fields may be important influences on attitudes towards use.

Essentially, the more experience, knowledge, and perceived value of computers a person has, the more inclined that he/she will be towards using computers and implementing them in various aspects of their classrooms.

Methods

Students in this study were enrolled in the state mandated course for teacher candidates at Cal Poly, Pomona. Students were asked to volunteer responses to a questionnaire which was designed to assess student attitudes and experience using the computer. They were told that their participation in the study was optional, but that their cooperation would be greatly appreciated.

A total of 90 students responded to this questionnaire overall (these are responses from 5 separate sections of the computer course). Of these students 77% were female, and 23% male. Breakdown in terms of grade level was as follows: Primary (K-6)--45.6%; Middle School (7-8)--15.6%; High School (9-12)--23.3%; College level--3.3%; and those neglecting to respond--12.2%. In terms of education: 1.1% of the respondents had educations below a BA or BS; 84.4% had BA or BS; 13.3% had an MA or MS; and 1.1% were beyond their MA's.

Ages of students were as follows: 18-22 year olds--4.4%; 23-30 year olds--51.1%; 3-40 year olds--33.3%; and those students above 40 years of age--11.1%. It should be noted that males in the program were older than females. Most males fell within the 31-40 year old category, while most females were within the 23-30 year old category.

Since this course or its equivalent are required of all students wishing to obtain a clear teaching credential, these classes have students that are from all specialty fields within the school of education. This means that a representative cross section of students from the school of education was probably obtained.

The survey contained *three types* of questions. First, there were questions designed to help determine the backgrounds of the students in terms of their mathematical and computer experiences. In this section, the students were asked the following questions:

1) How many math courses did you complete in high school?;
2) How many math courses did you complete in college?;
3) Have you used the computer before?;
4) Do you use the computer regularly for word processing?;
5) Do you use the computer regularly for spreadsheets?;
6) Do you use the computer regularly for data-bases?;
7) Do you own a personal computer?;
8) Do you program the computer regularly?;
9) How many years have you used the computer?;
10) How many computer languages do you know?

These questions provide both interval and dichotomous data.

The second part of the survey contained questions designed to determine attitudes towards computer use. Students questioned here were provided with a four point Likert scale: (4) Strongly Agree; (3) Agree; (2) Disagree; (1) Strongly Disagree. In this section, students were asked:

1) If they plan on using the computer in their classrooms;
2) If they were comfortable using the computer;
3) How interested they were in taking computer courses;
4) If they believe that instructional software is of high quality;
5) If they felt that school districts allocate sufficient funds for computer programs;
6) If they believed that the computer was beneficial to school age children;
7) If they believe the computer was important to primary (k-6) teachers;
8) If they believed the computer was important to intermediate (7-8) teachers;
9) If they believe the computer is important to high school teachers;
10) If they believe teachers should be required to know how to write instructional software;
11) If they believe that teachers should have basic computer literacy skills.

Students were also asked about the topics they felt were important and relevant to their use of the computer in the classroom. Ordinal data was again provided in this area using the same Likert scale. In this section, teachers were asked if they would be interested in learning: a) Wordprocessing; b) spreadsheets for the purpose of maintaining gradebooks; c) database programs for the purpose of keeping records on students; d) telecommunications as it applies to education; e) use of instructional software packages in their subject areas; f) programming using computer languages; g) the history of computing; and f) the latest uses of technology in the classroom. The Appendix shows a copy of the questionnaire that was used in this study.

The technique of forward, free-entry multiple regression was used to help determine the factors influencing teacher attitude. In this area, regressions were run with three different dependent variables. These variables were: 1) If the teacher planned on using the computer in his/her classroom; 2) How comfortable the teacher felt with the idea of using the computer; and 3) The teacher's interest in taking other computer courses. These measures of attitude would seem to be good indicators of how likely a particular teacher will be to make effective use of computers in the future.

For independent variables, several of the questions from those listed above provided the basis for this pool. In addition, the level of education for these teachers was included as an independent variable. Missing data was handled using mean substitution. Tolerance levels were set at 0.30 to eliminate any possible effects of multi-colinearity.

Descriptive statistics and results of the multiple regressions are presented in the following section.

Results

The following table presents information regarding computer use and experience. Although most of the students in this study have had some exposure to the computer at one time or another, the majority of them do not use the computer regularly.

Table 1--Measures of Experience

Question	Yes (pct)	No (pct)
1	89.0	11.0
2	46.7	53.3
3	11.1	88.9
4	6.7	93.3
5	35.6	64.4
6	4.4	95.6

1--I have used the computer before
2--I use a computer regularly for word processing
3--I use a computer regularly for spreadsheets
4--I use a computer regularly for data bases
5--I own a personal computer
6--I program the computer regularly

In terms of mathematical preparation and computer background, this study shows that the typical student has completed about three courses in mathematics in college, one course in computer use, and three years of math in high school. The typical student has had about two years of exposure to computer use (although not necessarily frequent use as indicated in the previous data), and has some knowledge of one programming language (refer to table 2). Overall, it seems as though the mathematical and computer backgrounds of the students in this program are very limited.

Table 2--Mathematical and Computer Background

Question	Mean	Median	Mode	Std Dev	Std Err
I	2.76	3.00	3.00	1.42	0.15
II	1.24	1.00	0.00	1.23	0.13
III	3.37	3.00	4.00	1.01	0.11
IV	2.04	1.50	0.00	1.86	0.20
V	0.84	1.00	0.00	0.93	0.10

I Number of math courses taken in college
II No. of computer courses taken overall
III No. of math courses completed in high school
IV No. of years using the computer
V No. of computer languages that you know

On attitudinal measures, it is interesting to note that most teachers planned on using the computer in their classrooms, and that the majority of these individuals felt relatively confident in using the computer--even with their limited backgrounds. In terms of perceived importance, most teachers believe the computer is important to all grade levels, although the data suggest that the computer is believed to be more useful to high school teachers, and somewhat less useful to middleschool and primary teachers. Teachers do not feel that they should know how to maintain and repair computers. Most are interested in pursuing other courses in computer education. Most teachers also feel that good educational software exists, but that school districts do not allocate sufficient funds to purchase such software and the equipment to run it. Most strongly believe that computerized instruction is beneficial to students, and that the computer is becoming a ubiquitous fixture in today's classrooms. It is interesting to note that even with these beliefs, that these teachers do not feel that the computer is currently playing an important instructional role. (See table 3).

Table 3--Measures of Attitudes and Perceived Importance

Question	Mean	Median	Mode	Std Dev	Std Err
A	3.47	4.00	4.00	0.68	0.07
B	3.41	3.50	4.00	0.69	0.07
C	2.33	2.00	2.00	0.82	0.09
D	3.09	3.00	3.00	0.74	0.08
E	1.83	2.00	2.00	0.77	0.08
F	2.89	3.00	3.00	0.09	0.82
G	3.27	3.00	3.00	0.64	0.07
H	3.30	3.00	3.00	0.59	0.06
I	3.42	3.00	3.00	0.60	0.06
J	3.53	4.00	4.00	0.57	0.06
K	2.84	3.00	3.00	0.68	0.07
L	2.90	3.00	3.00	0.62	0.07
M	2.52	2.00	2.00	0.79	0.09

(Responses were measured on a Likert Scale: 4 = Strongly Agree; 3 = Agree; 2 = Disagree; 1 = Strongly Disagree)

(n = 90)

A--I plan on using educational software packages in my classroom.
B--I feel very comfortable with the idea of using the computer.
C--Teachers should know how to repair and maintain computers.
D--I am interested in taking other computer courses.
E--The quality of instructional software is not great.
F--School districts do not allocate sufficient funds to make the use of the computer worthwhile.
G--Computer assisted instruction is becoming more beneficial.
H--The computer is important to primary (K-6) teachers.
I--The computer is important to intermediate (7-8) teachers.
J--The computer is important to secondary (9-12) teachers.
K--The computer is becoming more integrated in the classroom in all subject areas.
L--The computer is becoming more integrated in the classroom at all grade levels.
M--The computer plays an important instructional role in most classrooms today.

In the area of curriculum content (what teachers feel should be taught in a fundamental computer course), most teachers felt that it was important to: 1) Have literacy skills; 2) Know how to use a word processor; 3) Know how to use a spreadsheet; 4) Know how to use a database; 5) Be taught about telecommunications in education; 6) Be taught how to use instructional software in their fields of specialty; 7) Know how to program the computer; 8) Be taught about the history of computing; and 9) Be taught about the latest uses of technology in the classroom.

Teachers did not feel that they should be required to know how to write an instructional software package. Part of this stems from the fact that these teachers believed that ten weeks was not a sufficient amount of time to learn how to write a package that was as effective as a professionally engineered piece of software. It should be noted that teachers were less interested in programming and history when compared to other aspects of computer curriculum.

Table 4--Topic Areas Teachers Feel Should Be Emphasized

Questions	Mean	Median	Mode	Std Dev	Std Err
N	2.22	2.00	2.00	0.88	0.09
O	3.28	3.00	3.00	0.52	0.06
P	3.32	3.00	3.00	0.63	0.07
Q	3.24	3.00	3.00	0.67	0.07
R	3.10	3.00	3.00	0.65	0.07
S	3.06	3.00	3.00	0.63	0.07
T	3.39	3.00	3.00	0.60	0.06
U	2.61	3.00	3.00	0.76	0.08
V	2.66	3.00	3.00	0.73	0.08
W	3.30	3.00	3.00	0.57	0.06

(n = 90)

N--Teachers should be required to know how to write instructional software.
O--Teachers should have basic computer literacy skills.
P--Teachers should be taught how to use wordprocessing packages.
Q--Teachers should be taught how to use spreadsheet packages to help maintain gradebooks.
R--Teachers should be taught how to use database programs to help keep records on individual students.
S--Teachers should be taught about the uses of telecommunications in education
T--Teachers should be taught how to use instructional software packages in their subject areas.
U--Teachers should be taught how to program the computer using computer languages.
V--The history of computing is an important aspect of any computer curriculum.
W--Teachers should be taught about the latest uses of technology in the classroom.

The descriptive statistics mentioned above may be useful in providing insight in the structuring educational computer curriculums. Knowledge of what the students perceive as useful should certainly be taken into account when designing the framework for such

courses, especially since the respondents are responsible adults who will be or are currently managing classrooms in primary and secondary schools.

Regression Analysis

Multiple regression was used to help determine which factors, if any, influence teacher attitudes towards computer use. The technique forward, free entry multiple regression was used. The following list shows the pool of variables that the computer was allowed to select from during the free-entry process:

V2--I plan on using the computer in the classroom.
V3--I feel comfortable using the computer.
V5--I am interested in taking other computer courses.
V9--The computer is important to primary (k-6) teachers.
V10--The computer is important to intermediate (7-8) teachers.
V11--The computer is important to secondary (9-12) teachers.
V16--Teachers should be required to have computer literacy.
V17--Teachers should learn word processing.
V18--Teachers should learn spread sheets.
V19--Teachers should learn data bases.
V20--Teachers should learn telecommunications.
V24--Teachers should know the latest uses of technology in the classroom.
V26--Number of college math courses taken
V27--Teaching Grade level
V28--Level of Education
V29--Number of computer courses taken
V30--Number of math courses taken in high school
V31--Number of years using the computer
V32--Number of computer languages known
V33--I use the computer regularly for word processing.
V34--I use the computer regularly for spread sheets.
V35--I use the computer regularly for data bases.
V36--I own a personal computer.
V34--I program the computer regularly.

The first regression run utilized "Comfort Using the Computer (V3)" as the dependent variable. The following results were obtained:

Table 5--Multiple Regression with V3 as the Dependent Variable

Variable	B	Beta	T	Sig T
V2	0.25	0.24	2.49	0.01
V31	0.10	0.27	2.91	<0.01
V5	0.24	0.26	2.77	<0.01
V36	0.26	0.18	2.00	<0.01
Constant	1.24	-----	3.10	<0.01

Multiple R = 0.57 R Square = 0.32
Adjusted R Square = 0.29 DF = 85
Signif F < 0.001

These data indicate that the regression equation is significant. It also shows that the four independent variables in the equation can explain about 29% of a person's comfort using the computer. In rank order of importance, V31, which is the number of years using the computer is the highest, followed by V5, which is interest in other courses. V2 is next, which is the student's intention to use the computer in the classroom, followed by V36, which is whether or not a person owns a personal computer.

The next regression run used "Interest in Other Courses (V5)" as the dependent variable.

Table 6--Multiple Regression with V5 as the Dependent Variable

Variable	B	Beta	T	Sig T
V20	0.33	0.28	2.95	0.004
V29	0.22	0.38	3.91	<0.01
V3	0.31	0.107	2.93	<0.01
V31	-0.11	-0.29	-2.79	<0.01
Constant	0.93	-------	2.28	0.02

Multiple R = 0.58 R Square = 0.33
Adjusted R Square = 0.30 DF = 85
Signif F < 0.001

Interest in other courses appears to be affected most by the number of computer courses already taken (V29). The next most important factor is the number of years using the computer (V31). This is followed by the person's interest in telecommunications (V20), and finally the comfort using the computer (V3). These variables combine to explain 30% of a teacher's interest in taking other computer courses. The F value of the regression equation indicates that it is also significant.

It should be noted that although the following variables did not enter into the regression equation, that they still may have an influence on the dependent variable (V5). These variables are: V2--Plan on using the computer in the classroom (Sig % = 0.08); and V28--Level of education (Sig T = 0.08).

The third regression equation used V2 as the dependent variable, which is the teacher's intent to use the computer in the classroom.

Table 7--Multiple Regression with V2 as the Dependent Variable

Variable	B	Beta	T	Sig T
V11	0.38	0.32	3.42	<0.01
V3	0.29	0.29	3.31	<0.01
V19	0.25	0.24	2.56	0.01
Constant	0.39	-----	2.56	0.40

Multiple R = 0.60 R square = 0.35
Adjusted R Square = 0.33 DF = 86
Signif F < 0.001

In this equation, the teacher's preparation of the computer's importance to secondary (9-12) teachers (V11), was the most important factor. This was followed by V3, which is the comfort using the computer. And finally, V19, which is the importance of data-base software to teachers. These variables explain 33% of a teacher's intent to use the computer in the classroom. The F value of this regression equation indicates that it is significant.

It should be noted that although the following variables did not enter into the equation, they may still have an influence on the dependent variable: V27--Teaching Grade level (Sig T = 0.07); V32--No. of computer languages known (Sig T = 0.07); and V35--I use the computer regularly for data-bases (Sig T = 0.08).

Discussion

The results of the regression analysis show that the Comfort a student feels towards using a computer is affected by:

1) The number of years he/she has used the computer;
2) The student's interest in other courses;
3) The student's intention to pursue other courses;
4) Whether or not a student owns a personal computer.

Interest in other courses is affected by:

1) The number of computer courses already taken;
2) The number of years using a computer;
3) Interest the person has for educational use of telecommunications;
4) Comfort using the computer.

The teacher's intent to use the computer in the classroom and the teacher's level of education are two other variables that may affect interest in other courses.

The teacher's intent to use the computer in his/her classroom appears to be affected by:

1) The perceived importance of computers to secondary (9-1) teachers;
2) Comfort using the computer;
3) The perceived importance of database using skills to teachers.

It seems that the basic hypotheses of this paper have been confirmed by the data acquired in this study. Teacher attitudes towards computer use can be affected favorably if they have an understanding of how computers can be used most effectively. A majority of the teachers in this study had a desire to make use of utility programs, such as word processors, data bases, and spreadsheets. These teachers also had a desire to be exposed to telecommunications and other aspects of technology in education. It seems that if teachers are informed about the power of computer use in the classroom, they will tend to have more favorable attitudes towards learning computers.

Comfort using the computer is enhanced if teachers have *more experience* using the machine. This intuitively makes sense, but the data support this notion. The amount of experience can be increased if the teacher has ready access to a computer. This is probably why owning a computer is an important factor influencing a person's comfort using the device.

By increasing the amount of computer experience a teacher has, and the amount of training he/she has received (in the form of formal classwork), it is possible to stimulate interest in further coursework (giving a person a taste of the subject matter may encourage further pursuit in the discipline). This assumes that the student receives positive experiences in their initial coursework, which will further stimulate their interest. The data in this study indicates that coursework stimulates interest in more coursework.

`If issues of policy were to be established based upon the findings in this study, it might be recommended that students be exposed to as much computer use as possible. The more familiar the student is with the machine, the more comfortable he/she will be in working with it. Giving students experience in computer use at early ages would help accomplish part of this goal. Perhaps the requirement of several computer courses instead of just one might help to further this idea. It must be realized that many student curriculums are already quite rigorous, and that the implementation of additional requirements may place too great a burden on the student populace (This problem would probably be greater in institutions of higher learning than in the public school system). The positive and negative aspects of such a policy must be weighed. It should be noted that with more experience and formal training, more awareness of the computer's capabilities with exist as well.

Secondly, the purchase of computers by teachers might be encouraged by teacher training institutions. The availability of student discounts, or educator's discounts should be made common knowledge, so that economic considerations of such investment will be

limited as must as possible. Making the computer readily available is likely to increase the student's use of the machine, and therefore the amount of experience that he/she acquires.

To summarize, education and exposure seem to be the key issues in this area of stimulating computer use. Policy in this area might be geared towards increasing both of these aspects to make computer programs more effective.

To conclude this article, it should be mentioned that although the data from the regression analyses support the issues of policy just stated, that none of the regressions had coefficients of determination exceeding 0.34. This means that less than 34% of each of the aspects of teacher attitude were predicted by the independent variables in each equation. Although these numbers are high enough to have impact, there is a large percentage of information that is unknown concerning teacher attitudes. Therefore, it would be unwise to execute policies based solely upon the data in this study. It would probably be more helpful to gather other information that would increase the scope of knowledge in this area.

References

1. Bitter, G. G., (1984). Computers in today's world. New York: John Wiley & Sons.

2. Bitter, G. G., & Hatfield, M. M., (1989). Computing and mathematics, Journal of Reading, Writing, and Learning Disabilities. 5, 1-21.

3. Cohen, A. L., (1988). Improving speed and accuracy of word recognition in reading disabled children: an evaluation of two computer program variations, Learning Disability Quarterly. 8, 333-340.

4. Gross, B., (1989). Can computer assisted instruction solve the dropout problem? Educational Leadership. 46, 49-51.

5. Hofmeister, A., (1984). Microcomputer applications in the classroom. New York: Holt, Rinhart and Winston.

6. Hunter, B., (1983). My students use computers. Reston, Virginia: Reston Publishing Company.

7. Kay, R. H., (1989). Gender differences in computer attitudes, literacy, locus of control, and commitment. Journal of Research on Computing in Education. 21, 307-317.

8. Lockard, J., & Abrams, P., (1987). Microcomputers for educators. Boston, Massachusetts: Little, Brown & Compsny.

9. McKeown, P., (1988). Living with computers. New York: Harcourt Brace Jovanovich.

10. Riedesal, C. A., & Clements, D. H., (1985). Coping with computers in elementary and middle schools. Englewood Cliffs, New Jersey: Prentice-Hall Inc.

11. Turner, J. A., (1989). Teacher-training colleges' slow move to computers blamed for schools' lag in integrating technology. The Chronicle of Higher Education. 35 (1), p. A9.

12. Walker, D. F., (1983). Reflections on the educational potential for microcomputers. Phi Delta Kappan. June, pp. 103-107.

13. Watt, D. H., (1980). Computer literacy: what should schools be doing about it? Classroom Computer News, November/December, pp. 26-27.